REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*

2. REPORT DATE

3. REPORT TYPE AND DATES COVERED

4. TITLE AND SUBTITLE

Side-Scan Sonar Investigation of Shallow-Water Depositional Processes In and Around Block Island Sound: Before and After the Nor'easter of 1992

5. FUNDING NUMBERS

N00014-94-1-0089

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8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Office of Naval Research
800 N. Quincy Street
Arlington, VA 22217-577-

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

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12a. DISTRIBUTION/AVAILABILITY STATEMENT

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12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

Using side-scan and sub-bottom sonar, we surveyed portions of Block Island Sound before and after the occurrence of a number of large storms to determine how storm events modify the distribution and type of bedforms, sedimentary facies, and acoustic backscatter of shelf sediments. Our analysis of the data suggest that the passage of these large storms did not significantly modify the existing sedimentary bedforms or the large-scale acoustic backscatter patterns observed in Block Island Sound. One explanation for this surprising observation is that the submerged portion of the Ronkonkoma glacial moraine, which extends from Montauk Point at the tip of Long Island to Block Island and continues northward to Point Judith, Rhode Island, acts as a natural jetty at the mouth of Block Island Sound, dissipating much of the storms' wave energy. Correlation of sub-bottom and side-scan sonar data in conjunction with surficial sediment type indicates that the physiography and subsurface geology generated during the last glaciation and deglaciation strongly influences the present-day sediment transport, erosion, and deposition in Block Island Sound. Although there are no significant large-scale changes observed between 1991 and 1994, numerous smaller-scale changes are observed

14. SUBJECT TERMS

Block Island Sound, acoustic backscatter, sand waves

15. NUMBER OF PAGES

24

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

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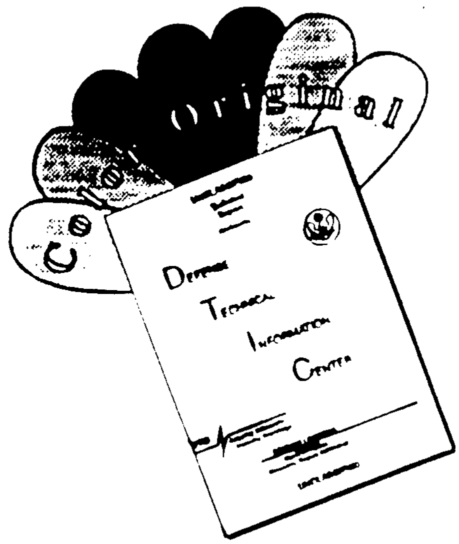

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Side-Scan Sonar Investigation Of Shallow-Water Depositional Processes In And Around Block Island Sound: Before And After The Nor'easter Of 1992

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Final Report for Project N00014-94-1-0089

Abstract

Using side-scan and sub-bottom sonar, we surveyed portions of Block Island Sound before and after the occurrence of a number of large storms (Hurricane Bob, 1991; Halloween Nor'easter, 1991; Nor'easter, 1992; Blizzard of 1993) to determine how storm events modify the distribution and type of bedforms, sedimentary facies, and acoustic backscatter of shelf sediments. Our analysis of the sonar and sample data suggest that the passage of these large storms did not significantly modify the existing sedimentary bedforms or the acoustic backscatter patterns observed in Block Island Sound. One explanation for this surprising observation is that the submerged portion of the Ronkonkoma glacial moraine, which extends from Montauk Point at the tip of Long Island to Block Island and continues northward to Point Judith, Rhode Island, acts as a natural jetty at the mouth of Block Island Sound, dissipating much of the storms' wave energy. Consequently, the deeper portions of Block Island Sound that are located in the lee of the shoal are somewhat isolated from the effects of large storm systems. Correlation of sub-bottom and side-scan sonar data in conjunction with surficial sediment type indicates that the physiography and subsurface geology generated during the last glaciation and deglaciation strongly influences the present-day sediment transport, erosion, and deposition in Block Island Sound.

Although there are no significant large-scale changes observed between 1991 and 1994, numerous smaller-scale changes are observed. For example, the width and sinuosity of the tidal-induced sand waves located in the southeast corner of the survey varied between surveys. These variations are most likely recording the passage of storm systems. Another obvious change observed in the study region is due to anthropogenic effects on the seafloor in Block Island Sound. The distribution and density of trawl door scars caused by fishing gear dragged across the seafloor have markedly increased compared to the 1991 survey.

Long-Term Goals:

Sand layers dominate the stratigraphy of many shallow marine shelf environments and are commonly interpreted as storm-generated deposits. Even though storm conditions prevail for only a small percentage of the time, their effects on sediment transport and erosion along and across the shelf can be disproportionately large. Our understanding of how storm systems affect shelf sediment dynamics, however, remains incomplete. Long-term monitoring sites along a variety of continental shelf settings are required to increase our understanding of how storm events affect sediment transport, erosion, and deposition on modern-day shelves. Consequently, the long-term goals of this project are to develop repeat monitoring sites in a number of different continental shelf environments to: (1) examine how pre-existing physiography and seafloor geology modulates the effects of storms, (2) determine if different types of storm systems and their varied trajectories affect the shelf differently, (3) assess how shelf bedforms are modified by storm events, and (4) define the relationships among physical processes operative on a small spatial and temporal scales, the formation of sedimentary signatures (e.g., "event strata"), and preservation of the longer-term stratigraphic record. Understanding the processes that shape and sculpt the present-day continental shelf is the necessary first step toward interpreting the geologic record preserved on continental shelves and responsible management of this invaluable resource.

Scientific Objectives:
• Determine how storm events modify the distribution and type of bedforms, sedimentary facies, and acoustic backscatter amplitude of shelf sediments in Block Island Sound.
• Assess the relationship between acoustic backscatter amplitude, surficial grain size distribution, and bottom roughness.
• Examine how the subsurface geology and physiography of Block Island Sound affect the present-day hydrodynamics and consequent "event stratigraphy".

Background:
Although hurricanes have a major effect on the geology of beaches and coastal regions, recent studies that have monitored the adjacent shallow water regions before and after the passage of hurricanes (e.g., Hurricane Andrew) reveal that these storm systems appear to have had a minimal impact on the seafloor. These studies highlighted the fact that many variables such as fetch, duration, velocity, varying barometric pressure, and trajectory interact to affect the geologic potential of hurricanes. Even though hurricanes are highly destructive on land, they are usually somewhat spatially confined and rarely last more than two or three tidal cycles. Thus their potential to cause geologic change might be less than other types of large storms. Our working hypothesis is that Nor'easters might have greater potential to shape and sculpture the shallow water seafloor than hurricanes because they last for several tidal cycles, have enormous fetch, gale force winds, and their trajectory results in onshore winds along much of the US East Coast. Near bottom flow velocities up to 60 cm/sec have been measured during the passage of Nor'easters on the Atlantic shelf in water depths of 10 to 20 meters. The unidirectional flow and the attendant wave-driven oscillatory flow represent a combined flow regime that increases the likelihood of sediment reworking and transport along the shelf. Consequently, we resurveyed Block Island Sound onboard the R/V HENLOPEN (July 28 - August 9, 1994) to determine if the passage of a number of Nor'easters caused any discernible change on the seafloor within the study region.

Approach:
Using 100 kHz Klein side-scan and 3.5 kHz sub-bottom sonar, we surveyed portions of Block Island Sound before and after the occurrence of a number of large storms (Hurricane Bob, 1991; Halloween Nor'easter, 1991; Nor'easter, 1992; Blizzard of 1993) to determine how storm events modify the shelf (Figure 1). At sea onboard the R/V Henlopen, these data were transferred to a workstation where they were processed using the GPS navigation, printed, and mosaiced into a composite image of the study area. Decisions concerning sediment sampling and camera tows were based on the field mosaic. Over two hundred bottom samples (Table 1; box cores & Van Veen grab samples) were collected throughout the study area to examine the relationship between side-scan acoustic backscatter amplitudes and sediment grain size variations. Twelve 3-hour camera tows (exposure every 8 m along track) were collected across regions with different acoustic backscatter in order to correlate acoustic backscatter amplitudes with sediment type and surface roughness. The camera tows were also used to study the benthic biology and its variability in the study region.

Accomplishments and Results:
(1)The 100 kHz EG&G side-scan sonar data collected in 1991 were imported, reprocessed, and georeferenced using software available at the USGS, Woods Hole, MA. The resulting mosaic served as a base map for the 1994 cruise.
(2) The 100 kHz Klein side-scan sonar data collected onboard the R/V Henlopen (4 x 9 nautical mile area) have been processed and merged with the navigation so that the 1994 and 1991 data sets can be coregistered to determine how the study area has changed during that period.
(3) Grain size analyses of the Van Veen (1994) and Box Cores (1991 & 1994) have been completed (Figure 2). Samples were freeze dried to avoid particle aggregation that would

potentially bias the results. Sieve sizes of 0.0625, 0.125, 0.250, 0.500, 1.0, and 2.00 mm were used to determine the grain size distribution of each sample.

(4) Mean acoustic backscatter amplitudes were determined around the location of the Van Veen and Box cores sites. To remove any artifacts introduced by differential GPS navigation uncertainties (accuracy ~10 m), we calculated the mean acoustic backscatter for varying size areas around each core location: 13, 21, 40, 61, and 80 m^2. The variation in the acoustic backscatter amplitudes with increasing box size was minimal except for areas near the margins of different acoustic backscatter regions. Consequently, we used a 21 m^2 box size to calculate the mean acoustic backscatter amplitude around each core site. The backscatter amplitude for the entire side-scan mosaic was normalized and scaled from 0 (dark - low backscatter) to 255 (white - high backscatter). Cores located on or near the nadir of the side-scan swath were removed from the analysis. Furthermore, cores located in regions where artifacts compromised the data (e.g., thermocline interference) were also removed from the analysis.

(5) Correlations among grain size variations, bottom roughness, and acoustic backscatter amplitudes have been analyzed.

(6) Interpretation of the subbottom seismic data (uniboom and airgun), 3.5 kHz in conjunction with the 100 kHz side-sonar data has resulted in a nested survey in the study region that has allowed us to examine the importance of the pre-existing physiography and subsurface geology on the modern-day depositional regime.

(7) Camera photos have been developed and the camera runs have been coregistered to the 3.5 kHz, side-scan sonar, and core data. Combination of these data sets allows characterization of the geologic features in Block Island Sound both before and after the passage of large storm systems.

(8) Analysis of variance of gray scale values between the orthogonal side-scan surveys collected in 1994 have been completed to determine how acoustic backscatter amplitudes vary with look orientation.

Analysis of the sonar and core data suggest that the passage of these large storms did not cause any significant large-scale changes on the seafloor in Block Island Sound. One explanation for this surprising observation is that the submerged portion of the Ronkonkoma glacial moraine, which extends from Montauk Point at the tip of Long Island to Block Island and continues northward to Point Judith, Rhode Island, acts as a natural jetty at the mouth of Block Island Sound, dissipating much of the storms' wave energy (Figure 1). The shoal lies 7 to 12 meters below the water's surface, and the seafloor behind the shoal in Block Island Sound deepens to 18 to 40 meters (Figure 2). Though submerged, the sandy shoal acts as a barrier at the entrance to the Sound, absorbing the energy of storm-generated waves. Consequently, the deeper portions of Block Island Sound, which are located in the lee of the shoal, are somewhat isolated from the effects of large storm systems. Another reason why there might have been no significant changes observed in Block Island Sound as a result of these storm systems is the trajectory of the storms and the prevailing winds. As the name implies, the prevailing wind direction associated with Nor'easters is from the northeast and consequently much of the study region is in the lee of Block Island (Figure 1).

Although there are no significant large-scale changes observed between 1991 and 1994, numerous smaller-scale changes are observed. For example, the width and sinuosity of the tidal-induced sand waves, located in the southeast corner of the survey, have changed between surveys. The sand waves occur along the northern portion of the shoal situated between Montauk and Block Island (Figures 2 and 3). The largest sand waves have amplitudes of ≈5-7 meters and wavelengths on the order of 100s of meters. Individual sand waves that make up the sand wave field in the southeast portion of the survey area can be confidently correlated from the 1991 and 1994 survey (Figure 4). Comparison of the two data sets indicate that the width of the individual sand waves has broadened slightly while their sinuosity has diminished. Furthermore, the backscatter amplitude of the region to the northwest of the sand waves appears to have diminished between 1991 and 1994 (Figure 4). Another obvious change observed in the study

region is due to anthropogenic effects on the seafloor in Block Island Sound. The distribution and density of trawl door scars caused by fishing gear dragged across the seafloor have markedly increased compared to the 1991 survey (Figure 5). However, it is difficult to determine if this represents a seasonal variation or a long term trend because of the sampling strategy employed. The 1991 data were collected in early spring while the 1994 were collected in mid-summer. A repeat survey in early spring would allow us to discern between the alternative explanations for the difference in the density of trawl door scars observed in the two data sets.

Our interpretations of the geophysical and geological data indicate that the surficial morphology of the study region in Block Island Sound is quite varied and complex with portions dominated by sand waves, megaripples, and sand ribbons, whereas other regions are dominated by trawl marks. Correlation of sub-bottom and side-scan sonar data in conjunction with surficial sediment type indicates that the physiography generated during the last glaciation and deglaciation strongly influences the present-day sediment transport, erosion, and deposition in Block Island Sound. Regions of high acoustic backscatter, prolonged acoustic echo character, and large boulders are spatially coincident with subcrops/outcrops of Cretaceous strata in the study area. In addition, there is a strong correlation between mean grain size, sorting, and bathymetric relief (Figures 2 and 3). Small increases in water depth on the order of meters within the study region are associated with lower acoustic backscatter amplitudes and lower weight percentages of coarse sand and gravel in the surficial sediment. Note that the 32 m isobath roughly correlates with the change from low to high acoustic backscatter in the study region (Figures 2 and 3).

Examination of the sediment grain size variations and acoustic backscatter amplitudes (Figure 6) indicates that there is positive correlation between acoustic backscatter and grain size variations in the study region. The mean grain size and sorting were calculated for the Van Veen and Box cores. Mean grain size calculations are dependent on the sieve interval used and the distribution of grain sizes within a given interval. To avoid the ambiguity associated with mean grain size analysis, we also plotted acoustic backscatter amplitudes against the weight percent for each sieve interval (Figure 7). Note there is a strong negative correlation between the acoustic backscatter amplitudes and the weight percent of the very fine sand (0.0625 - 0.125 mm). Cumulative grain size analysis indicates that a negative correlation exists between acoustic backscatter and the weight percent less that 0.250 mm and likewise a positive correlation between acoustic backscatter and the weight percent greater than 0.250 mm. Although correlations between mean grain size and acoustic backscatter are informative, coring transects across acoustic backscatter boundaries better illustrates the relationship between grain size and acoustic backscatter variations. Figure 8 shows a transect of four Van Veen cores across a boundary between high and low acoustic backscatter. This acoustic backscatter boundary also corresponds to an increase in water depth (Figures 2 and 3). Grain size analysis of the cores shows a systematic decrease in the medium sand (.250-.500 mm), coarse sand (0.500 - 1.00 mm), very coarse sand (1.00 - 2.00 mm), and the gravel (>2.00 mm) from the region of high acoustic backscatter to the adjacent area of low acoustic backscatter. Note that even though Van Veen cores 194 and 191 are from a region of high acoustic backscatter, they still contain significant weight percentages of fine sand and silt (Figure 8). Because acoustic backscatter amplitudes record the relative distribution of grain size, it is important to examine the entire population when trying to develop predictive techniques that relate acoustic backscatter amplitudes to grain size variations. Furthermore, because acoustic backscatter amplitudes also record bottom roughness, bottom photographs were analyzed to determine how bottom roughness affected backscatter amplitudes.

The crest of the sand waves located in the southeast corner of the survey area have low acoustic backscatter amplitudes despite the fact that they are composed of well-sorted, medium sand (Figures 3 and 4). In fact, the backscatter amplitude for the sand waves is equal to, or less than, regions composed of fine sand and silt (Figure 3). On the basis of the backscatter

amplitudes alone, one would predict that the region is composed of fine sand and silt, which is not consistent with the core data. Bottom photographs reveal that these regions of the seafloor are covered by a complex pattern of multifaceted sand waves that are superposed on the crest of the larger more continuous, north-northeast trending sand waves. Because the bedforms are multi-faceted and of the appropriate scale, they scatter the volume of energy very efficiently in three dimensions. Most side-scan analysis determines whether a feature is facing toward or away from the vehicle, but fails to consider three-dimensional scattering of the acoustic energy. The multifaceted waves are similar to "stealth technology", which minimizes the cross-sectional area insonified by the side-scan sonar vehicle. Based on these observations, we propose that bottom roughness on scales less than the wavelength of the side-scan sonar "footprint" increases backscatter amplitudes, whereas roughness on scales greater than the wavelength of side-scan sonar "footprint" can potentially diminish backscatter amplitudes. More research is required to determine the exact scale dependence between bottom roughness and backscatter amplitudes.

Scientific Impact:

We are beginning to understand how different continental shelf environments are influenced by storm events as well as the importance of shelf physiography and geology in modulating the effects of storms. The scaling relationships between the physical processes operative on small spatial and temporal scales, the formation of sedimentary signatures ("event" stratigraphy), and preservation of the longer-term stratigraphic record must be clarified in order to construct realistic quantitative stratigraphic models of the continental shelf. Understanding how and over what time scales the continental shelf evolves also has practical applications with respect to offshore cables, pipelines, exploratory wells, dumping grounds for dredge spoils, and marine channels. The results of this project complement the objectives of a number of ongoing and proposed research projects within the ONR STRATAFORM Initiative.

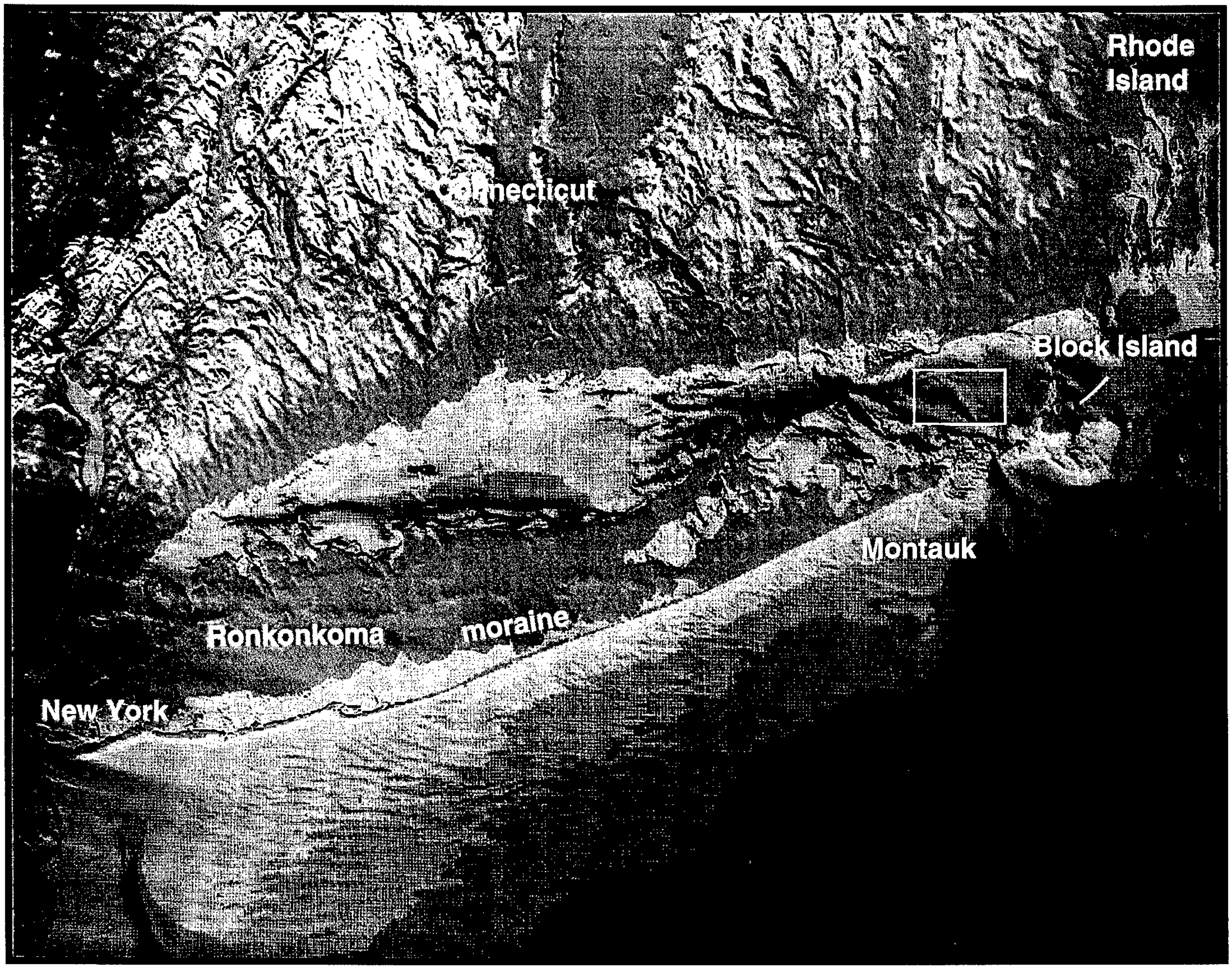

Figure 1. White rectangle shows Block Island Sound area surveyed in 1991 and 1994. Lighter shades of green denote regions with higher elevations above sea level and darker shades of blue indicate regions with greater water depth.

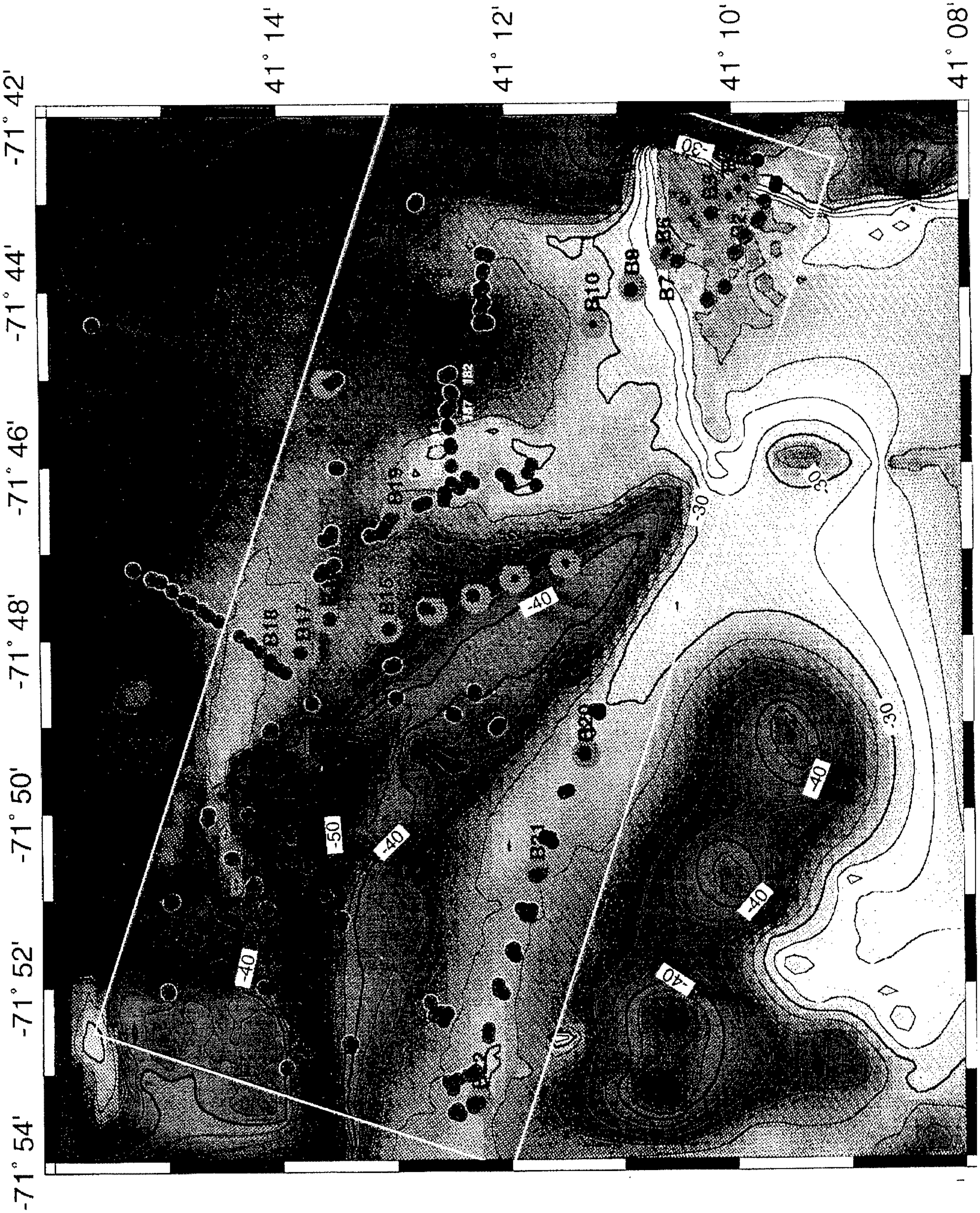

Figure 2. Bathymetric map of the study region showing the location of the 1994 side-scan survey and coring stations. Purple dots denote box core sites and black dots show the location of the Van Veen cores.

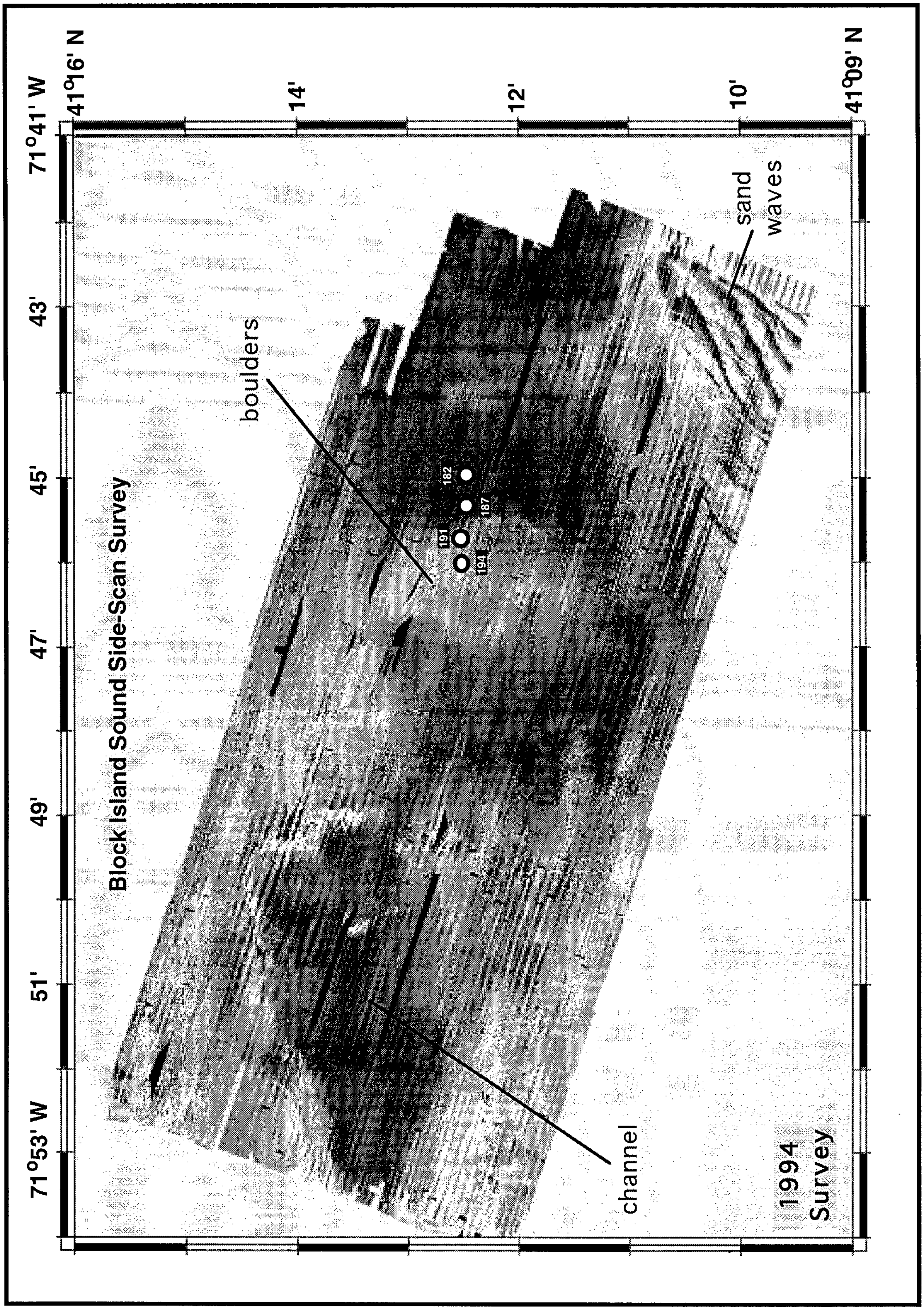

Figure 3. Side-scan mosaic of Block Island Sound. Circles denote the location of Van Veen samples shown in Figure 8.

1991 1994

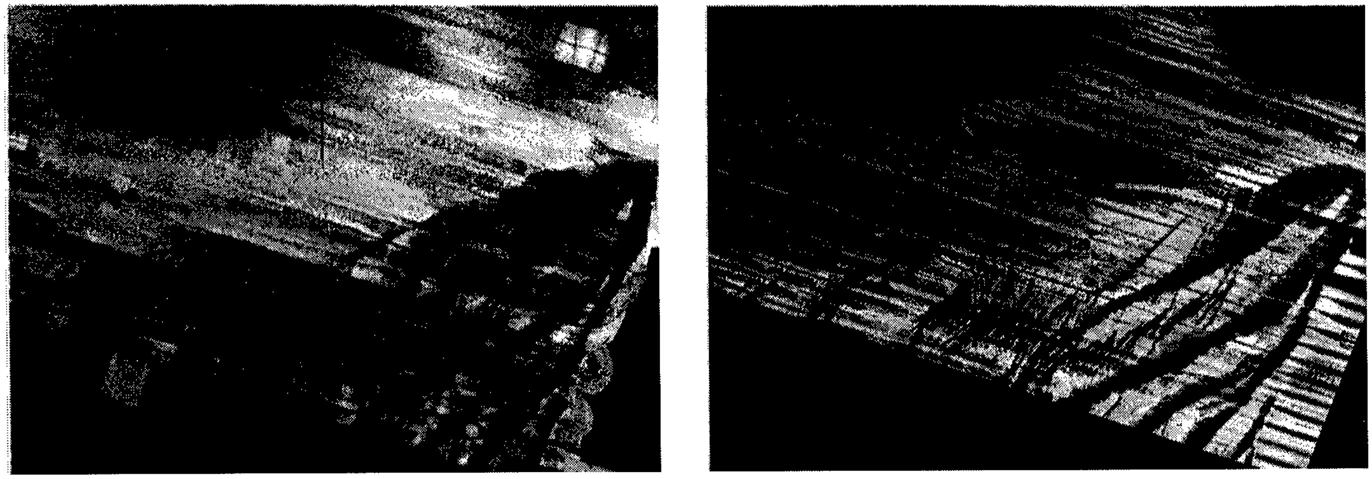

Figure 4. Comparison of the 1991 and 1994 side-scan sonar data showing the sand waves in the southeast corner of the survey area. Sand wave amplitudes are ~ 5-7 m with wavelengths of 100s of meters. The sand waves correspond to the low-backscatter [dark] stripes. Images represent a 3.7 by 5.7 km area.

1991 1994

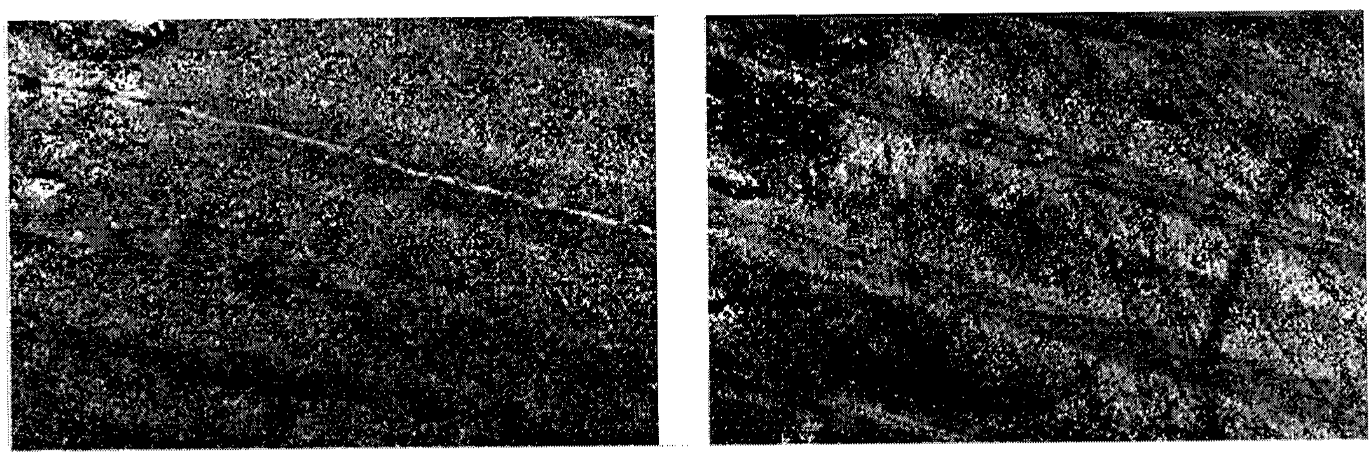

Figure 5. The boulders in the upper left corners of these photos were used to coregister the 1991 (left) and the 1994 (right) images for comparison purposes. Note that the trawl marks visible in 1994 do not appear in the 1991 image. Images represent a 300 by 500 m area.

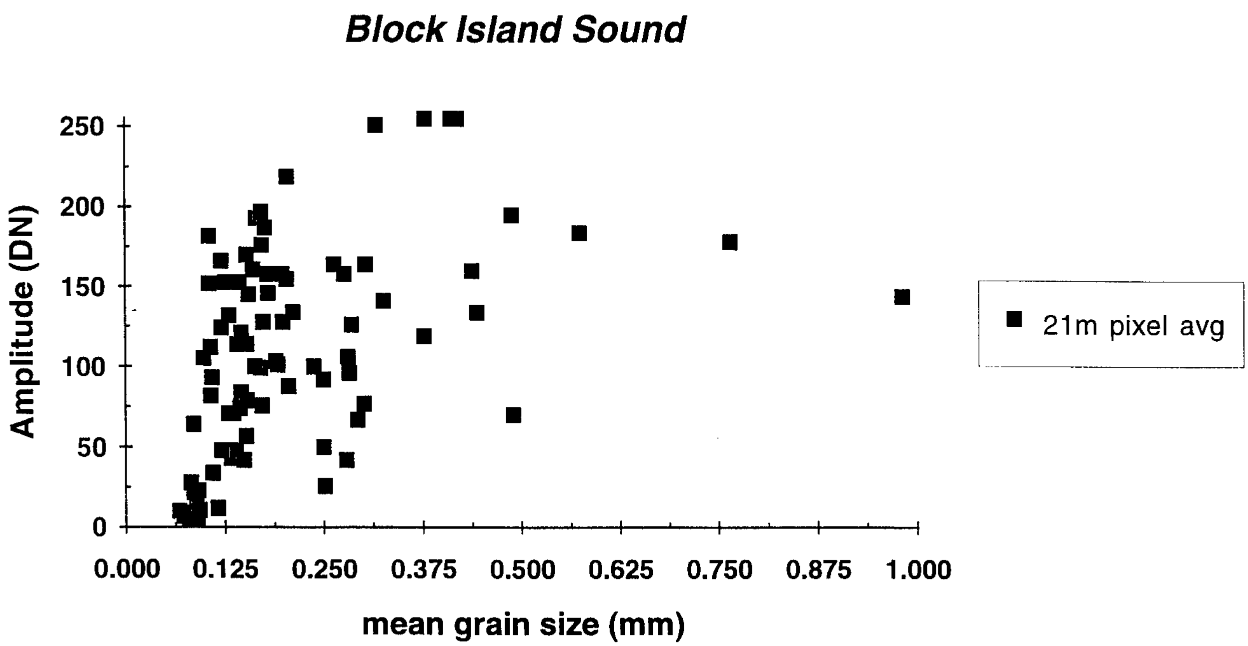

Figure 6. Plot of mean grain size distribution versus acoustic backscatter amplitude reveals a positive correlation between acoustic backscatter and grain size.

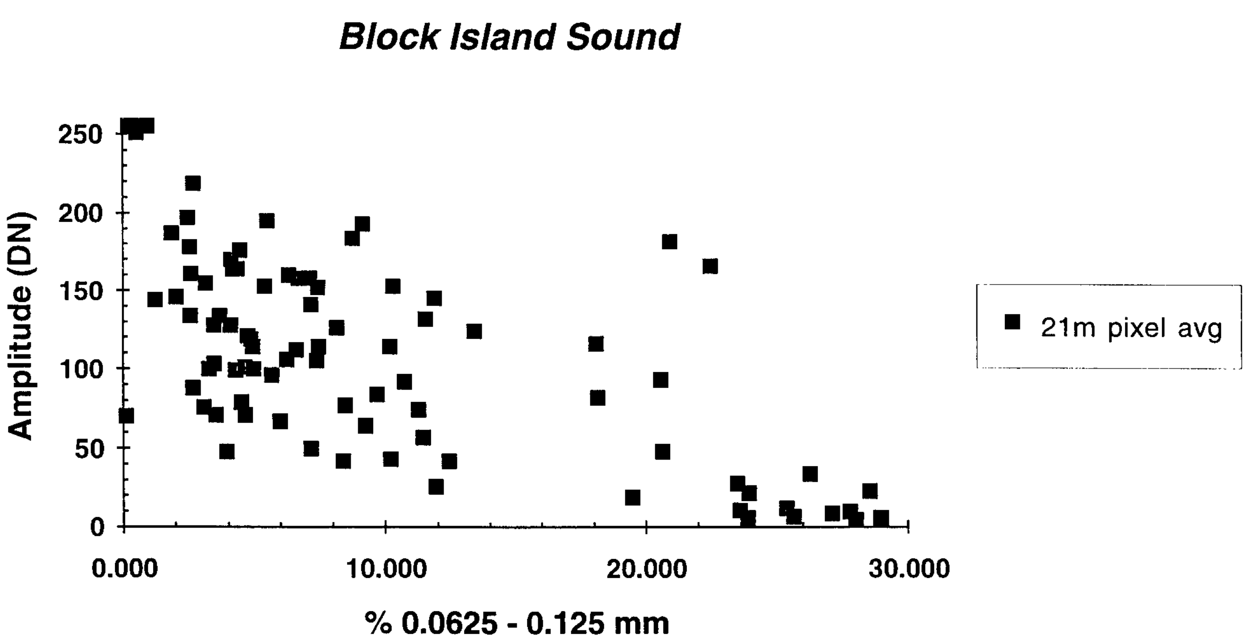

Figure 7. Plot of weight percent of very fine sand (0.0625 - 0.125 mm) versus acoustic backscatter amplitude. Note the strong negative correlation between acoustic backscatter and weight percent of very fine sand.

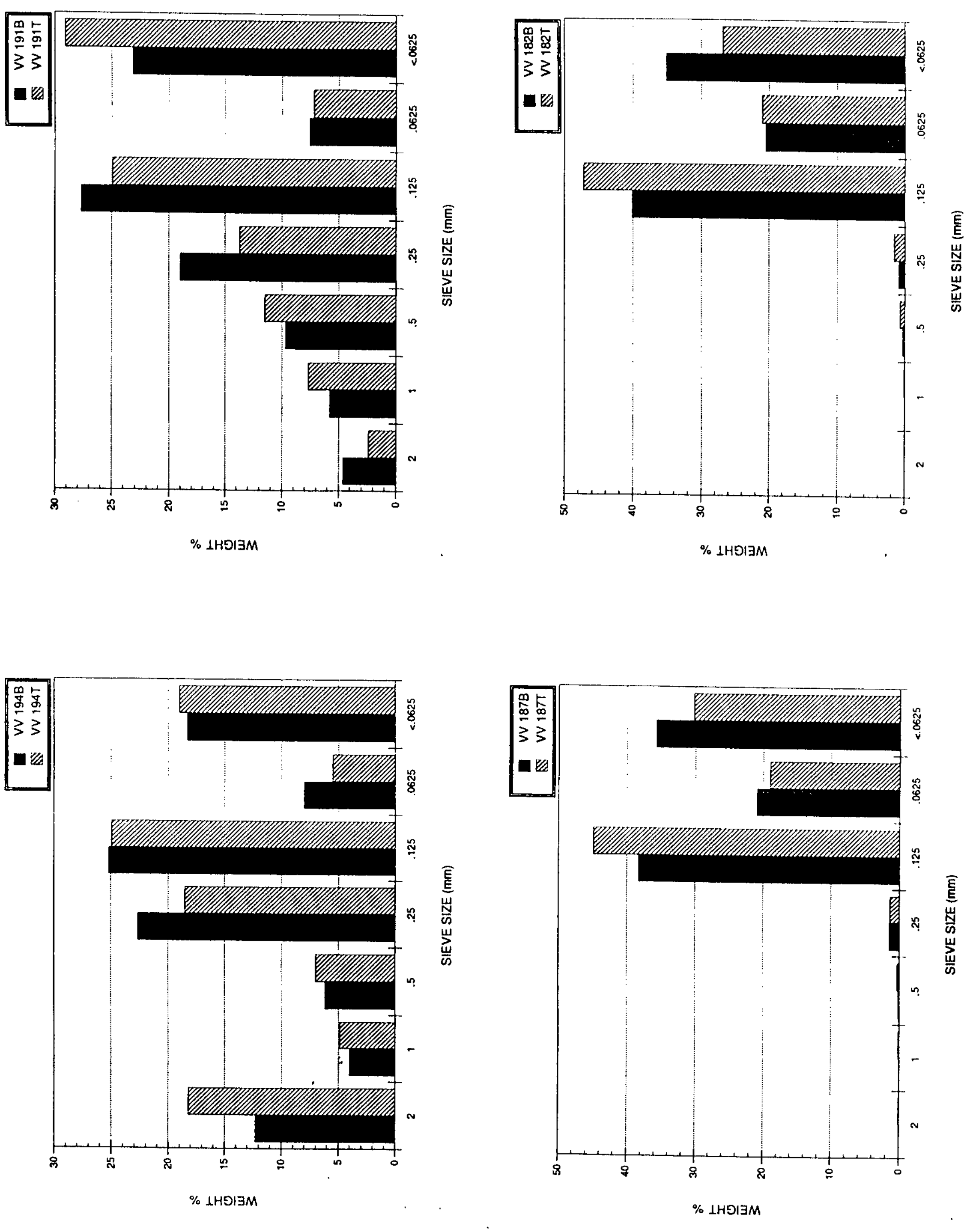

Figure 8. Grain size analysis of four Van Veen cores that form a transect across an acoustic backscatter boundary. Core locations are shown in Figures 2 and 3. Note that the cores from regions with high acoustic backscatter have a greater weight percent of coarse sand and gravel.

BLOCK ISLAND SOUND CORE SAMPLES

TOP CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV 3	T	10.00	0.07	0.18	2.14	6.73	0.54	0.05	0.27	9.98
VV 4	T	10.00	0.00	0.01	0.30	5.21	1.88	0.41	1.90	9.71
VV 5	T	7.70	0.00	0.03	0.22	0.64	3.40	0.62	2.41	7.32
VV 9	T	10.00	0.00	0.03	0.08	1.30	3.69	0.63	3.81	9.54
VV 10	T	10.00	0.00	0.13	0.24	2.59	3.82	0.73	2.30	9.81
VV 12	T	10.00	0.00	0.03	0.05	2.38	5.61	0.46	1.21	9.74
VV 13	T	10.00	0.00	0.12	0.35	4.15	3.78	0.45	0.85	9.70
VV 14	T	10.00	0.01	0.03	0.12	2.46	5.64	0.68	0.97	9.91
VV 15	T	10.00	0.00	0.01	0.10	3.20	4.42	0.40	1.63	9.76
VV 16	T	10.00	0.00	0.01	0.08	2.05	4.44	0.53	2.73	9.84
VV 17	T	10.00	0.00	0.02	0.19	3.40	4.24	0.25	1.62	9.72
VV 18	T	10.00	0.00	0.01	0.07	2.28	5.43	0.48	1.46	9.73
VV 19	T	10.00	0.00	0.03	0.02	1.14	6.89	0.45	1.15	9.68
VV 20	T	10.00	1.53	0.14	0.08	1.33	5.83	0.36	0.53	9.80
VV 22	T	10.00	0.01	0.01	0.02	0.59	7.01	0.83	1.34	9.81
VV 24	T	10.00	0.00	0.06	0.12	1.43	5.97	0.70	1.50	9.78
VV 26	T	10.00	0.30	0.29	0.37	1.85	4.58	0.81	1.56	9.76
VV 27	T	10.00	0.18	0.04	0.42	1.77	4.31	1.24	1.66	9.62
VV 28	T	10.00	2.12	0.18	0.33	1.30	3.57	0.88	1.49	9.87
VV 29	T	10.00	1.82	0.26	0.47	1.15	3.66	0.95	1.49	9.80
VV 30	T	10.00	0.50	0.76	0.89	1.41	3.84	1.39	1.04	9.83
VV 32	T	10.00	0.02	0.13	0.16	0.63	2.57	0.71	5.40	9.62
VV 33	T	10.00	0.00	0.10	0.23	0.90	3.23	0.73	4.65	9.84
VV 34	T	10.00	1.04	0.40	0.87	1.17	3.09	0.48	2.82	9.87
VV 35	T	10.00	0.15	0.40	0.50	1.10	2.67	0.69	4.18	9.69
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VV 45	T	10.00	0.64	0.42	0.49	1.19	2.24	0.69	4.11	9.78
VV 46	T	10.00	0.83	0.42	0.59	1.42	2.39	0.70	3.41	9.76
VV 47	T	10.00	0.39	0.32	0.43	0.82	3.07	1.01	3.94	9.98
VV 48	T	10.00	0.00	0.19	0.65	1.82	3.12	1.17	2.91	9.86
VV 49	T	10.00	0.00	0.18	0.38	1.11	3.48	1.12	3.45	9.72
VV 50	T	10.00	0.00	0.19	0.26	0.88	3.51	1.31	3.63	9.78
VV 51	T	10.00	0.22	0.05	0.08	1.34	5.14	0.91	2.21	9.95
VV 52	T	10.00	0.21	0.06	0.10	2.14	5.01	0.85	1.49	9.86
VV 53	T	10.00	0.21	0.02	0.03	1.10	3.97	1.01	3.48	9.82
VV 54	T	10.00	1.01	0.05	0.03	1.01	3.69	0.83	3.19	9.81
VV 55	T	10.00	0.06	0.06	0.06	1.70	5.01	1.00	1.95	9.84

BLOCK ISLAND SOUND CORE SAMPLES

TOP CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV 56	T	10.00	0.05	0.09	0.17	2.06	4.02	0.95	2.48	9.82
VV 57	T	10.00	0.47	0.20	0.81	2.65	3.52	0.83	1.39	9.87
VV 58	T	10.00	0.07	0.37	1.32	3.35	3.07	0.71	1.01	9.90
VV 59	T	10.00	0.00	0.27	1.13	3.80	3.28	0.73	0.72	9.93
VV 60	T	10.00	0.00	0.01	0.03	0.10	3.83	2.75	3.10	9.82
VV 61	T	10.00	0.00	0.01	0.02	0.09	4.19	2.79	2.74	9.84
VV 62	T	10.00	0.00	0.01	0.01	0.07	5.02	2.81	1.93	9.85
VV 63	T	10.00	0.17	0.21	1.27	5.28	1.88	0.56	0.53	9.90
VV 64	T	10.00	0.27	0.27	1.14	4.87	1.80	0.59	0.93	9.87
VV 65	T	10.00	0.75	0.14	0.92	4.62	2.10	0.68	0.64	9.85
VV 66	T	10.00	0.00	0.00	0.05	0.30	4.64	2.31	2.49	9.79
VV 67	T	10.00	0.00	0.02	0.03	0.23	3.93	2.32	3.17	9.70
VV 68	T	10.00	0.00	0.01	0.02	0.18	3.94	2.31	3.37	9.83
VV 69	T	10.00	0.10	0.07	0.11	2.03	3.26	1.77	2.45	9.79
VV 70	T	10.00	2.16	0.05	0.20	2.80	2.98	0.86	0.76	9.81
VV 71	T	10.00	0.01	0.05	0.07	1.32	2.75	2.02	3.44	9.66
VV 72	T	10.00	0.00	0.00	0.01	0.15	3.73	2.86	3.13	9.88
VV 73	T	10.00	0.00	0.01	0.01	0.12	2.47	2.72	4.46	9.79
VV 74	T	10.00	0.00	0.01	0.01	0.10	3.63	2.64	3.35	9.74
VV 75	T	10.00	0.00	0.02	0.06	1.83	3.92	2.03	1.98	9.84
VV 76	T	10.00	0.47	0.17	0.22	2.66	3.63	1.17	1.49	9.81
VV 77	T	10.00	0.00	0.12	0.17	2.63	3.71	1.23	2.04	9.90
VV 78	T	10.00	0.00	0.03	0.07	1.28	3.65	1.77	2.96	9.76
VV 79	T	10.00	0.00	0.01	0.05	1.31	3.97	2.01	2.43	9.78
VV 80	T	10.00	0.00	0.01	0.21	3.36	3.17	1.12	1.92	9.79
VV 81	T	10.00	0.01	0.13	0.27	0.34	4.27	2.49	2.31	9.82
VV 82	T	10.00	0.00	0.01	0.04	0.14	2.84	2.50	4.23	9.76
VV 83	T	10.00	0.03	0.13	0.27	0.26	3.39	2.57	3.14	9.79
VV 84	T	10.00	0.00	0.01	0.15	3.61	5.25	0.24	0.53	9.79
VV 86	T	10.00	0.00	0.02	0.35	4.09	4.14	0.20	1.11	9.91
VV 87	T	10.00	0.00	0.01	0.20	3.88	4.83	0.18	0.69	9.79
VV 88	T	10.00	0.00	0.01	0.10	3.14	4.56	0.44	1.52	9.77
VV 89	T	10.00	0.00	0.01	0.36	3.93	3.51	0.30	1.68	9.79
VV 90	T	10.00	0.01	0.02	0.60	4.80	3.62	0.26	0.55	9.86
VV 91	T	10.00	0.05	0.07	1.18	4.73	2.84	0.32	0.66	9.85
VV 92	T	10.00	0.02	0.04	0.80	4.74	2.77	0.25	1.18	9.80
VV 93	T	10.00	0.00	0.00	0.38	4.00	3.50	0.40	1.53	9.81
VV 94	T	10.00	0.01	0.03	0.97	3.93	3.12	0.28	1.44	9.78
VV 95	T	10.00	0.00	0.02	0.59	4.24	3.49	0.34	1.19	9.87
VV 96	T	10.00	0.01	0.01	0.27	3.13	4.46	0.48	1.34	9.70
VV 97	T	10.00	0.00	0.04	0.98	3.14	3.88	0.33	1.40	9.77
VV 98	T	10.00	0.00	0.04	1.29	2.67	4.29	0.34	1.22	9.85
VV 99	T	10.00	0.04	0.04	0.57	2.48	4.43	0.43	1.70	9.69
VV101	T	10.00	0.00	0.10	0.99	3.11	4.71	0.31	0.65	9.87
VV102	T	10.00	0.00	0.02	0.20	1.87	5.20	0.66	1.63	9.58

BLOCK ISLAND SOUND CORE SAMPLES

TOP CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV103	T	10.00	0.03	0.08	0.93	2.85	4.42	0.42	1.00	9.73
VV104	T	10.00	0.00	0.04	0.60	4.31	3.56	0.42	0.85	9.78
VV105	T	10.00	0.00	0.01	0.30	3.94	3.95	0.51	1.01	9.72
VV106	T	10.00	0.00	0.02	0.18	3.00	3.54	0.73	2.03	9.50
VV107	T	10.00	0.00	0.00	0.11	4.00	4.52	0.42	0.79	9.84
VV108	T	10.00	0.00	0.04	0.10	2.35	5.00	0.59	1.63	9.71
VV109	T	10.00	0.00	0.00	0.03	2.13	4.78	0.85	1.93	9.72
VV110	T	10.00	0.00	0.01	0.02	2.43	4.96	0.68	1.62	9.72
VV111	T	10.00	0.00	0.01	0.12	2.11	6.24	0.56	0.75	9.79
VV112	T	10.00	0.00	0.01	0.06	2.36	5.66	0.53	1.13	9.75
VV113	T	10.00	0.00	0.01	0.15	2.22	5.88	0.45	1.04	9.75
VV114	T	10.00	0.00	0.02	0.20	2.34	4.13	0.72	2.20	9.61
VV115	T	10.00	0.00	0.02	1.41	4.68	2.92	0.24	0.51	9.78
VV116	T	6.78	0.00	0.01	0.67	2.63	2.69	0.18	0.54	6.72
VV117	T	10.00	0.00	0.08	0.27	2.43	4.25	0.99	1.61	9.63
VV118	T	10.00	0.01	0.45	1.65	3.31	3.38	0.44	0.58	9.82
VV119	T	10.00	0.00	0.03	0.39	2.51	4.05	0.93	1.82	9.73
VV120	T	10.00	0.00	0.09	0.91	2.91	4.64	0.59	0.66	9.80
VV121	T	10.00	0.00	0.11	1.27	5.08	2.79	0.24	0.27	9.76
VV122	T	10.00	0.00	0.12	3.34	4.13	2.01	0.21	0.10	9.91
VV123	T	10.00	0.00	0.11	3.12	3.82	1.75	0.34	0.67	9.81
VV124	T	10.00	0.07	0.04	0.10	1.57	5.48	1.00	1.38	9.64
VV125	T	10.00	0.04	0.04	0.30	2.14	6.22	0.59	0.52	9.85
VV126	T	10.00	0.03	0.03	0.28	1.90	4.96	1.03	1.40	9.63
VV127	T	10.00	0.00	0.02	0.18	1.17	5.52	1.42	1.40	9.71
VV128	T	10.00	0.12	0.01	0.25	1.71	5.25	1.13	1.28	9.75
VV129	T	10.00	0.00	0.02	0.10	1.95	5.18	0.91	1.42	9.58
VV130	T	10.00	0.00	0.01	0.07	1.88	5.00	0.99	1.74	9.69
VV131	T	10.00	0.00	0.01	0.10	1.39	5.49	1.26	1.48	9.73
VV132	T	10.00	0.00	0.01	0.02	0.16	3.24	3.36	2.78	9.57
VV133	T	10.00	0.00	0.00	0.02	0.10	3.08	3.48	2.89	9.57
VV134	T	10.00	0.00	0.00	0.01	0.10	3.36	3.41	2.76	9.64
VV135	T	10.00	0.34	0.14	0.45	2.23	3.05	1.35	2.05	9.61
VV136	T	10.00	0.31	0.27	0.57	1.72	2.91	1.62	2.19	9.59
VV137	T	10.00	0.74	0.42	0.69	2.10	2.41	1.19	2.06	9.61
VV138	T	10.00	3.98	0.55	1.38	2.20	0.84	0.27	0.62	9.84
VV139	T	10.00	4.39	0.96	1.80	2.09	0.45	0.16	0.10	9.95
VV140	T	10.00	0.03	0.09	0.49	3.34	2.76	1.21	1.79	9.71
VV141	T	10.00	0.15	0.33	1.71	4.35	1.72	0.83	0.74	9.83
VV142	T	10.00	0.38	0.23	1.42	4.96	1.60	0.80	0.44	9.83
VV143	T	8.16	0.06	0.11	1.09	3.78	1.53	0.85	0.51	7.93
VV144	T	10.00	0.00	0.00	0.02	0.50	3.98	2.85	2.30	9.65
VV145	T	10.00	0.00	0.01	0.06	0.49	3.48	3.03	2.58	9.65
VV146	T	10.00	0.00	0.11	0.27	1.56	5.23	1.10	1.50	9.77
VV147	T	10.00	0.00	0.03	0.08	1.35	4.68	1.35	2.12	9.61

BLOCK ISLAND SOUND CORE SAMPLES

TOP CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV148	T	10.00	0.00	0.22	0.39	0.94	3.92	1.66	2.53	9.66
VV149	T	10.00	0.00	0.22	0.38	1.17	4.40	1.52	2.05	9.74
VV150	T	10.00	0.08	0.42	0.76	1.64	4.58	1.11	1.21	9.80
VV151	T	10.00	0.22	0.40	0.63	1.31	4.40	1.31	1.51	9.78
VV152	T	10.00	0.00	0.02	0.07	2.28	5.44	1.25	0.70	9.76
VV153	T	10.00	0.00	0.01	0.05	2.82	5.07	1.02	0.79	9.76
VV154	T	10.00	0.00	0.00	0.12	2.52	5.28	1.09	0.80	9.81
VV155	T	10.00	0.00	0.00	0.09	3.09	5.31	0.73	0.55	9.77
VV156	T	10.00	0.03	0.12	0.17	2.08	4.61	0.85	1.71	9.57
VV157	T	10.00	0.06	0.07	0.14	2.06	4.36	0.85	1.98	9.52
VV158	T	10.00	0.00	0.04	0.27	1.61	4.62	0.99	2.19	9.72
VV159	T	10.00	0.01	0.03	0.32	1.93	4.24	0.97	2.10	9.60
VV160	T	10.00	0.88	0.84	0.79	0.98	3.33	1.05	1.74	9.61
VV161	T	10.00	0.90	0.43	0.54	0.76	3.17	1.29	2.50	9.59
VV162	T	10.00	0.39	0.41	0.34	0.82	3.55	1.64	2.37	9.52
VV163	T	10.00	0.93	0.18	0.28	0.84	2.72	1.54	3.01	9.50
VV164	T	10.00	0.35	0.56	0.58	1.73	3.80	1.11	1.50	9.63
VV165	T	10.00	0.57	0.90	0.93	2.02	3.18	0.95	1.14	9.69
VV166	T	10.00	0.34	0.01	0.07	1.50	4.53	1.71	1.55	9.71
VV167	T	10.00	0.00	0.01	0.03	1.49	4.60	1.52	1.98	9.63
VV168	T	10.00	0.08	0.50	0.95	1.66	2.87	2.09	1.52	9.67
VV169	T	10.00	0.07	0.05	0.24	0.93	3.33	2.23	3.07	9.92
VV170	T	10.00	0.03	0.01	0.02	0.05	1.06	2.36	6.18	9.71
VV171	T	10.00	0.00	0.01	0.03	0.17	2.09	3.04	4.32	9.66
VV172	T	10.00	0.02	0.07	0.31	1.17	1.69	0.88	5.48	9.62
VV173	T	4.32	0.00	0.01	0.12	0.36	0.52	0.35	2.42	3.78
VV174	T	10.00	0.04	0.07	0.72	2.45	2.39	1.04	2.94	9.65
VV175	T	10.00	0.07	0.03	0.28	0.98	1.54	1.14	5.33	9.37
VV176	T	10.00	0.03	0.05	0.28	0.92	1.75	1.17	5.49	9.69
VV177	T	10.00	0.16	0.18	0.52	0.99	1.90	1.23	4.74	9.72
VV178	T	10.00	0.02	0.07	0.27	0.63	3.23	1.27	4.26	9.75
VV179	T	10.00	0.00	0.08	0.35	0.86	2.41	1.13	4.81	9.64
VV180	T	10.00	0.02	0.01	0.05	0.29	2.93	1.25	5.00	9.55
VV181	T	10.00	0.00	0.01	0.07	0.26	3.02	0.96	5.02	9.34
VV182	T	10.00	0.00	0.01	0.07	0.16	4.72	2.10	2.68	9.74
VV183	T	10.00	0.00	0.01	0.01	0.08	4.94	1.90	2.82	9.76
VV184	T	10.00	0.00	0.00	0.02	0.16	4.04	2.03	3.39	9.64
VV185	T	10.00	0.07	0.01	0.01	0.08	3.20	1.73	4.55	9.65
VV186	T	10.00	0.00	0.03	0.05	0.15	5.20	2.33	1.91	9.67
VV187	T	10.00	0.01	0.02	0.03	0.14	4.49	1.90	3.02	9.61
VV188	T	10.00	0.32	0.46	0.52	0.55	3.38	1.04	3.41	9.68
VV189	T	10.00	1.86	0.46	0.52	0.69	2.78	0.95	2.38	9.64
VV190	T	10.00	0.87	0.65	1.05	1.77	2.57	0.67	2.17	9.75
VV191	T	10.00	0.24	0.77	1.15	1.37	2.49	0.72	2.91	9.65
VV192	T	10.00	1.28	0.72	0.98	1.38	2.23	0.62	2.51	9.72

BLOCK ISLAND SOUND CORE SAMPLES

TOP CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV193	T	10.00	0.86	0.61	0.81	1.48	2.59	0.77	2.59	9.71
VV194	T	10.00	1.82	0.49	0.70	1.85	2.49	0.55	1.90	9.80
VV195	T	10.00	0.43	0.23	0.39	1.47	2.55	0.82	3.73	9.62
VV196	T	10.00	1.46	1.00	0.96	2.03	2.42	0.47	1.52	9.86
VV197	T	10.00	0.21	0.20	0.66	2.75	3.12	0.62	2.15	9.71
VV198	T	10.00	0.00	0.00	0.23	3.95	3.90	0.45	1.28	9.81
VV199	T	10.00	0.00	0.00	0.14	3.62	4.35	0.57	1.01	9.69
VV200	T	10.00	0.00	0.21	6.23	3.48	0.03	0.01	0.00	9.96
VV201	T	10.00	0.00	0.31	5.13	3.87	0.15	0.04	0.34	9.84
VV202	T	10.00	0.14	0.31	4.96	4.18	0.15	0.03	0.13	9.90
VV203	T	10.00	0.01	0.77	5.77	3.36	0.03	0.01	0.00	9.95
VV204	T	10.00	0.07	0.78	5.51	3.61	0.01	0.01	0.00	9.99
VV205	T	10.00	1.63	1.63	2.51	3.54	0.16	0.04	0.30	9.81
VV206	T	10.00	0.07	1.15	4.21	4.18	0.13	0.03	0.06	9.83
VV207	T	10.00	0.20	1.14	4.49	3.50	0.11	0.04	0.40	9.88
VV208	T	10.00	0.00	0.09	4.21	5.60	0.07	0.01	0.01	9.99
VV209	T	10.00	0.24	1.54	3.04	4.57	0.21	0.01	0.03	9.64
VV210	T	10.00	0.03	0.28	2.01	6.73	0.36	0.15	0.26	9.82
VV211	T	10.00	0.06	0.80	2.39	6.03	0.42	0.09	0.14	9.93

BLOCK ISLAND SOUND CORE SAMPLES
BOTTOM CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV 3	B	10.00	0.00	0.15	2.24	6.72	0.50	0.04	0.15	9.80
VV 4	B	10.00	0.01	0.01	0.84	6.40	1.62	0.24	0.75	9.87
VV 5	B	10.00	0.00	0.10	0.12	1.09	4.73	0.83	2.96	9.83
VV 9	B	10.00	0.17	0.29	0.51	2.01	4.04	0.52	2.24	9.78
VV 10	B	10.00	0.08	0.12	0.32	3.39	3.67	0.63	1.62	9.83
VV 12	B	10.00	0.00	0.04	0.25	4.16	4.56	0.27	0.60	9.88
VV 13	B	10.00	1.62	0.24	0.66	3.56	2.83	0.29	0.58	9.78
VV 14	B	10.00	0.00	0.04	0.16	2.66	4.97	0.64	1.33	9.80
VV 15	B	10.00	0.00	0.09	0.27	3.75	4.07	0.37	1.25	9.80
VV 16	B	10.00	0.01	0.02	0.21	3.65	4.34	0.32	1.24	9.79
VV 17	B	10.00	0.02	0.06	0.38	3.54	4.31	0.35	1.24	9.90
VV 18	B	10.00	0.00	0.01	0.13	2.77	5.40	0.42	1.16	9.89
VV 19	B	10.00	0.00	0.02	0.07	1.77	6.51	0.40	1.10	9.87
VV 20	B	10.00	1.96	0.12	0.09	1.40	5.49	0.30	0.47	9.83
VV 22	B	10.00	0.01	0.01	0.04	0.63	6.68	0.88	1.66	9.91
VV 23	B	6.50	0.00	0.02	0.01	0.39	3.36	0.61	2.04	6.43
VV 24	B	10.00	0.03	0.07	0.40	2.00	5.36	0.60	1.47	9.93
VV 26	B	10.00	0.12	0.38	0.93	2.15	3.83	0.61	1.61	9.63
VV 27	B	10.00	0.04	0.20	1.20	2.52	3.61	0.91	1.29	9.77
VV 28	B	10.00	1.92	0.16	0.42	1.59	3.68	0.80	1.28	9.85
VV 29	B	10.00	0.53	0.27	0.79	1.67	4.24	0.88	1.49	9.87
VV 30	B	10.00	0.57	0.84	1.10	1.78	3.14	1.14	1.18	9.75
VV 32	B	10.00	0.04	0.28	0.67	1.29	3.71	0.62	3.24	9.85
VV 33	B	7.18	0.01	0.15	0.28	0.74	2.80	0.42	2.67	7.07
VV 34	B	10.00	0.47	0.49	1.17	1.50	3.78	0.56	1.78	9.75
VV 35	B	10.00	0.93	0.64	0.69	1.24	2.77	0.57	2.90	9.74
VV 36	B	10.00	0.19	0.29	0.40	1.38	3.52	0.64	3.29	9.71
VV 37	B	10.00	0.20	0.48	0.89	1.94	3.22	0.60	2.54	9.87
VV 38	B	10.00	0.73	0.30	0.40	2.03	2.98	0.57	2.83	9.84
VV 39	B	10.00	0.48	0.43	0.57	1.91	3.21	0.70	2.54	9.84
VV 40	B	10.00	2.95	0.51	0.76	2.63	2.64	0.15	0.26	9.90
VV 41	B	10.00	1.14	0.90	1.13	2.04	2.79	0.54	1.31	9.85
VV 42	B	10.00	1.58	0.81	0.88	2.10	2.01	0.53	2.01	9.92
VV 43	B	10.00	0.90	0.77	1.02	2.24	2.47	0.50	1.94	9.84
VV 44	B	10.00	0.21	0.54	1.19	2.98	3.27	0.44	1.23	9.86
VV 45	B	10.00	1.50	0.57	0.89	1.85	2.34	0.52	2.17	9.84
VV 46	B	10.00	0.23	0.43	1.03	2.15	2.85	0.71	2.45	9.85
VV 47	B	10.00	0.86	0.61	0.73	1.23	2.83	0.93	2.68	9.87
VV 48	B	10.00	0.00	0.18	0.56	1.95	3.29	1.14	2.76	9.88
VV 49	B	10.00	0.00	0.42	1.10	1.82	3.00	0.84	2.58	9.76
VV 50	B	10.00	0.00	0.49	0.65	1.26	3.21	1.18	3.03	9.82
VV 51	B	10.00	0.08	0.04	0.06	1.34	5.21	0.98	2.23	9.94
VV 52	B	10.00	0.06	0.05	0.11	2.01	4.88	0.86	1.91	9.88
VV 53	B	10.00	0.07	0.03	0.08	1.86	4.92	0.96	1.96	9.88
VV 54	B	10.00	0.21	0.05	0.11	1.77	4.36	0.87	2.51	9.88

BLOCK ISLAND SOUND CORE SAMPLES

BOTTOM CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV 55	B	10.00	0.10	0.08	0.12	2.35	4.70	0.80	1.68	9.83
VV 56	B	2.10	0.00	0.02	0.13	0.55	0.82	0.11	0.47	2.10
VV 57	B	10.00	1.09	1.09	2.56	2.88	1.43	0.30	0.58	9.93
VV 58	B	10.00	0.73	0.84	2.50	3.08	1.74	0.37	0.66	9.92
VV 59	B	10.00	0.34	0.66	2.41	3.29	1.95	0.47	0.74	9.86
VV 60	B	10.00	0.00	0.02	0.05	0.11	4.32	2.83	2.60	9.93
VV 61	B	10.00	0.00	0.01	0.01	0.09	4.74	2.66	2.34	9.85
VV 62	B	10.00	0.00	0.02	0.02	0.18	4.80	2.30	2.58	9.90
VV 63	B	10.00	0.72	0.32	1.21	3.94	1.21	0.39	1.96	9.75
VV 64	B	10.00	2.12	0.34	1.04	3.46	1.13	0.37	1.44	9.90
VV 65	B	10.00	0.72	0.22	1.24	4.87	1.76	0.46	0.58	9.85
VV 66	B	10.00	0.00	0.02	0.07	0.47	4.75	2.03	2.53	9.87
VV 67	B	10.00	0.01	0.03	0.04	0.34	5.10	2.03	2.29	9.84
VV 68	B	10.00	0.00	0.04	0.05	0.27	5.00	2.02	2.45	9.83
VV 69	B	10.00	0.00	0.07	0.12	1.99	3.19	1.74	2.67	9.78
VV 70	B	10.00	0.89	0.35	0.47	3.04	2.40	0.80	1.88	9.83
VV 71	B	10.00	0.02	0.12	0.31	3.37	2.36	1.08	2.38	9.64
VV 72	B	10.00	0.00	0.01	0.03	0.25	4.54	2.30	2.72	9.85
VV 73	B	10.00	0.00	0.01	0.03	0.22	4.02	2.46	3.02	9.76
VV 74	B	10.00	0.00	0.00	0.01	0.27	3.73	2.14	3.65	9.80
VV 75	B	10.00	0.09	0.15	0.26	2.82	3.07	1.12	2.27	9.78
VV 76	B	10.00	0.23	0.33	0.54	3.36	3.06	0.76	1.55	9.83
VV 77	B	10.00	0.06	0.24	0.37	3.05	3.29	0.86	1.80	9.67
VV 78	B	10.00	0.00	0.05	0.35	3.18	3.47	1.11	1.71	9.87
VV 79	B	10.00	0.00	0.03	0.24	2.64	3.49	1.19	2.17	9.76
VV 80	B	10.00	0.00	0.01	0.24	3.42	3.14	1.13	1.90	9.84
VV 81	B	10.00	0.00	0.02	0.08	0.22	3.71	2.79	2.97	9.79
VV 82	B	10.00	0.00	0.01	0.01	0.15	3.49	2.36	3.84	9.86
VV 83	B	10.00	0.01	0.05	0.20	0.25	3.94	2.65	2.73	9.83
VV 84	B	10.00	0.01	0.01	0.09	3.07	5.49	0.37	0.82	9.86
VV 86	B	10.00	0.51	0.10	0.51	3.96	4.04	0.21	0.50	9.83
VV 87	B	10.00	0.01	0.01	0.36	5.17	4.03	0.09	0.22	9.89
VV 88	B	10.00	0.00	0.00	0.21	3.94	4.09	0.34	1.25	9.83
VV 89	B	10.00	0.04	0.06	0.86	4.60	3.55	0.24	0.46	9.81
VV 90	B	10.00	0.11	0.10	1.01	4.80	3.16	0.19	0.46	9.83
VV 91	B	10.00	0.00	0.04	0.58	5.13	2.91	0.35	0.80	9.81
VV 92	B	10.00	0.10	0.06	0.88	5.38	2.77	0.24	0.43	9.86
VV 93	B	10.00	0.00	0.03	0.50	4.95	3.24	0.31	0.82	9.85
VV 94	B	10.00	0.07	0.06	1.06	3.83	3.25	0.30	1.15	9.72
VV 95	B	10.00	0.00	0.01	0.63	4.39	3.60	0.35	0.83	9.81
VV 96	B	10.00	0.00	0.02	0.56	4.26	3.74	0.32	0.94	9.84
VV 97	B	10.00	0.00	0.08	1.77	2.96	4.03	0.28	0.75	9.87
VV 98	B	10.00	0.00	0.19	2.84	2.56	3.27	0.21	0.75	9.82
VV 99	B	10.00	0.00	0.06	1.48	3.11	3.89	0.34	0.95	9.83
VV101	B	10.00	0.02	0.25	1.60	2.86	3.92	0.32	0.93	9.90

BLOCK ISLAND SOUND CORE SAMPLES

BOTTOM CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV102	B	10.00	0.00	0.02	0.38	2.76	5.17	0.45	0.91	9.69
VV103	B	10.00	0.06	0.17	2.04	2.96	3.43	0.29	0.75	9.70
VV104	B	10.00	0.01	0.06	0.67	4.03	3.77	0.47	0.79	9.80
VV105	B	10.00	0.02	0.04	0.73	4.40	3.53	0.39	0.65	9.76
VV106	B	10.00	0.00	0.03	0.43	4.08	3.78	0.50	0.90	9.72
VV107	B	10.00	0.01	0.02	0.30	3.98	4.19	0.54	0.79	9.83
VV108	B #1	10.00	2.33	0.11	0.31	2.18	3.90	0.44	0.51	9.78
VV108	B #2	10.00	1.89	0.33	0.35	2.21	4.11	0.35	0.54	9.78
VV109	B	10.00	0.16	0.09	0.29	3.11	4.48	0.58	1.05	9.76
VV110	B	10.00	0.12	0.06	0.10	2.37	4.91	0.77	1.42	9.75
VV111	B	10.00	1.06	0.04	0.19	1.93	5.23	0.44	0.81	9.70
VV112	B	10.00	0.01	0.02	0.43	3.00	5.84	0.32	0.31	9.93
VV113	B	10.00	0.05	0.02	0.47	2.49	5.44	0.41	0.83	9.71
VV114	B	10.00	0.04	0.32	0.68	3.43	4.36	0.40	0.50	9.73
VV115	B	10.00	0.00	0.03	2.27	4.73	1.93	0.20	0.63	9.79
VV116	B	10.00	0.00	0.04	1.43	4.19	3.39	0.20	0.58	9.83
VV117	B	10.00	0.41	0.32	0.67	2.69	3.84	0.62	1.19	9.74
VV118	B	10.00	0.00	0.11	1.07	3.29	4.01	0.57	0.75	9.80
VV119	B	10.00	0.02	0.13	1.27	3.39	3.71	0.59	0.60	9.71
VV120	B	10.00	0.02	0.13	1.37	3.29	4.22	0.43	0.32	9.78
VV121	B	10.00	0.05	0.19	2.00	5.12	2.03	0.19	0.26	9.84
VV122	B	10.00	0.00	0.27	3.81	3.87	1.59	0.18	0.20	9.92
VV123	B	10.00	0.01	0.03	3.62	3.95	1.60	0.25	0.36	9.82
VV124	B	10.00	0.26	0.89	1.15	2.15	4.47	0.48	0.39	9.79
VV125	B	10.00	0.00	0.16	0.43	2.13	5.52	0.66	0.83	9.73
VV126	B	10.00	0.00	0.01	0.24	2.37	5.49	0.82	0.80	9.73
VV127	B	10.00	0.00	0.01	0.34	1.30	5.08	1.14	1.83	9.70
VV128	B	10.00	0.02	0.04	0.58	2.10	4.92	1.07	0.99	9.72
VV129	B	10.00	0.01	0.01	0.10	1.81	5.66	0.95	1.12	9.66
VV130	B	10.00	0.00	0.01	0.11	2.42	5.53	0.71	1.06	9.84
VV131	B	10.00	0.03	0.02	0.32	2.36	5.01	1.02	1.00	9.76
VV132	B	10.00	0.00	0.01	0.03	0.16	3.83	3.32	2.15	9.50
VV133	B	10.00	0.00	0.00	0.01	0.12	4.34	3.55	1.71	9.73
VV134	B	10.00	0.00	0.00	0.02	0.09	3.93	3.76	1.93	9.73
VV135	B	10.00	2.55	0.75	1.90	2.62	1.02	0.34	0.62	9.80
VV136	B	10.00	1.25	0.95	1.34	2.52	1.69	0.73	1.25	9.73
VV137	B	10.00	3.76	0.96	1.50	1.60	0.86	0.33	0.75	9.76
VV138	B	10.00	1.23	0.53	1.54	1.58	0.44	0.20	4.06	9.58
VV139	B	10.00	2.96	0.83	1.94	2.36	0.60	0.18	0.80	9.67
VV140	B	10.00	0.64	0.44	1.22	3.38	1.81	0.84	1.38	9.71
VV141	B	10.00	2.36	0.74	2.11	3.03	0.76	0.26	0.53	9.79
VV142	B	10.00	0.58	0.26	1.60	4.39	1.22	0.49	1.23	9.77
VV143	B	10.00	0.21	0.19	0.88	3.07	0.91	0.36	4.34	9.96
VV144	B	10.00	0.00	0.02	0.14	1.25	3.80	2.22	2.09	9.52
VV145	B	10.00	0.00	0.01	0.19	1.18	3.60	2.21	2.40	9.59

BLOCK ISLAND SOUND CORE SAMPLES

BOTTOM CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV146	B	10.00	0.09	0.24	0.35	2.11	4.28	1.30	1.37	9.74
VV147	B	10.00	0.00	0.03	0.08	1.82	5.02	1.29	1.52	9.76
VV148	B	10.00	0.12	0.35	0.89	1.49	3.61	1.30	1.95	9.71
VV149	B	10.00	0.10	0.78	2.54	2.26	1.78	0.60	1.65	9.71
VV150	B	10.00	0.10	0.27	0.80	1.66	4.27	0.86	1.60	9.56
VV151	B	10.00	0.04	0.16	0.56	1.34	4.93	1.28	1.40	9.71
VV152	B	10.00	0.00	0.01	0.13	2.92	4.89	0.77	1.00	9.72
VV153	B	10.00	0.00	0.01	0.13	3.44	4.60	0.59	0.89	9.66
VV154	B	10.00	0.03	0.08	0.71	4.30	3.62	0.51	0.46	9.71
VV155	B	10.00	0.89	0.09	0.45	3.18	3.81	0.62	0.74	9.78
VV156	B	10.00	0.48	0.20	0.48	2.37	3.62	0.83	1.66	9.64
VV157	B	10.00	0.45	0.60	1.08	2.55	3.29	0.60	1.10	9.67
VV158	B	10.00	0.00	0.15	0.71	2.39	4.03	0.73	1.66	9.67
VV159	B	10.00	0.03	0.10	0.67	2.49	3.80	1.03	1.50	9.62
VV160	B	10.00	0.37	0.55	0.68	0.82	3.66	1.39	2.12	9.59
VV161	B	10.00	0.13	0.42	0.51	0.97	3.90	1.66	2.01	9.60
VV162	B	10.00	0.21	0.45	0.38	0.81	3.73	1.81	2.28	9.67
VV163	B	10.00	0.21	0.45	0.38	0.88	4.02	1.68	2.02	9.64
VV164	B	10.00	0.96	0.90	0.93	2.17	3.15	0.77	0.85	9.73
VV165	B	10.00	1.38	0.74	0.95	1.74	2.63	0.80	1.43	9.67
VV166	B	10.00	0.02	0.03	0.05	2.05	5.05	1.29	1.23	9.72
VV167	B	10.00	0.12	0.03	0.04	1.60	4.36	1.48	1.96	9.59
VV168	B	10.00	0.06	0.23	0.66	1.57	3.03	2.29	1.87	9.71
VV169	B	10.00	0.11	0.09	0.45	1.07	2.98	2.40	2.51	9.61
VV170	B	10.00	0.00	0.01	0.14	0.24	1.69	2.02	5.63	9.73
VV171	B	10.00	0.00	0.01	0.02	0.23	2.22	2.81	4.22	9.51
VV172	B	10.00	0.05	0.04	0.25	1.44	2.52	1.61	3.63	9.54
VV173	B	2.81	0.00	0.02	0.05	0.32	0.69	0.36	1.30	2.74
VV174	B	10.00	0.08	0.09	0.95	2.96	2.49	1.17	1.93	9.67
VV175	B	10.00	0.04	0.07	0.71	3.00	2.50	1.01	2.25	9.58
VV176	B	10.00	0.03	0.34	1.56	2.19	2.17	1.02	2.28	9.59
VV177	B	10.00	0.00	0.14	0.92	1.55	2.24	1.33	3.32	9.50
VV178	B	10.00	0.06	0.07	0.42	0.75	3.30	1.43	3.49	9.52
VV179	B	10.00	0.00	0.21	0.73	1.38	3.17	1.16	2.88	9.53
VV180	B	10.00	0.00	0.02	0.20	0.32	3.16	1.42	4.52	9.64
VV181	B	10.00	0.00	0.01	0.05	0.51	4.00	1.53	3.60	9.70
VV182	B	10.00	0.00	0.00	0.03	0.09	4.01	2.05	3.51	9.69
VV183	B	10.00	0.00	0.01	0.03	0.10	4.49	1.52	3.67	9.82
VV184	B	10.00	0.00	0.00	0.01	0.10	4.72	2.20	2.73	9.76
VV185	B	10.00	0.00	0.00	0.02	0.08	3.37	2.06	4.19	9.72
VV186	B	10.00	0.00	0.01	0.04	0.17	4.08	1.81	3.48	9.59
VV187	B	10.00	0.00	0.00	0.02	0.15	3.83	2.09	3.58	9.67
VV188	B	10.00	0.28	0.56	0.58	0.74	3.82	1.39	2.33	9.70
VV189	B	10.00	0.36	0.58	0.70	0.69	3.47	1.24	2.64	9.68
VV190	B	10.00	1.25	1.02	1.34	1.33	2.10	0.72	2.02	9.78

BLOCK ISLAND SOUND CORE SAMPLES

BOTTOM CORES

Core ID	B or T	Wt.(g)	2.00mm	1.00mm	0.5mm	0.25mm	.125mm	.0625mm	<.0625mm	After Wt.
VV191	B	10.00	0.46	0.58	0.97	1.90	2.77	0.76	2.32	9.76
VV192	B	10.00	0.74	0.86	1.40	1.98	2.37	0.73	1.64	9.72
VV193	B	10.00	0.63	0.77	1.42	1.89	2.09	0.67	2.27	9.74
VV194	B	10.00	1.23	0.40	0.62	2.27	2.52	0.80	1.83	9.67
VV195	B	10.00	1.38	0.78	1.08	1.65	1.85	0.62	2.24	9.60
VV196	B	10.00	1.49	0.72	0.93	2.24	2.52	0.61	1.23	9.74
VV197	B	10.00	0.33	0.40	1.03	2.99	3.04	0.69	1.26	9.74
VV198	B	10.00	0.00	0.00	0.14	3.68	4.40	0.55	0.91	9.68
VV199	B	10.00	0.00	0.00	0.18	3.64	4.10	0.56	1.17	9.65
VV200	B	10.00	0.02	0.72	5.16	3.98	0.09	0.01	0.01	9.99
VV201	B	10.00	0.20	0.29	4.62	4.02	0.31	0.08	0.34	9.86
VV202	B	10.00	0.07	0.23	4.29	4.99	0.36	0.04	0.01	9.99
VV203	B	10.00	0.13	1.99	4.66	3.07	0.10	0.01	0.01	9.97
VV204	B	10.00	0.38	2.13	4.07	3.31	0.07	0.01	0.01	9.98
VV205	B	10.00	2.56	1.23	2.52	3.50	0.09	0.02	0.02	9.94
VV206	B	10.00	0.42	1.93	3.70	3.66	0.20	0.02	0.00	9.93
VV207	B	10.00	2.21	0.73	3.35	3.56	0.13	0.01	0.00	9.99
VV208	B	10.00	0.00	0.07	4.53	5.29	0.05	0.01	0.01	9.96
VV209	B	10.00	0.18	1.04	2.39	6.03	0.31	0.01	0.01	9.97
VV210	B	10.00	0.00	0.44	1.95	7.08	0.27	0.06	0.08	9.88
VV211	B	10.00	0.60	2.92	2.76	3.39	0.22	0.01	0.02	9.92

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Publications supported by ONR:

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Driscoll, N.W. and G.D. Karner (accepted). Lower crustal extension across the Northern Carnarvon Basin, Australia: Evidence for an eastward dipping detachment. Journal of Geophysical Research.

McGinnis, J.P., D.E. Hayes, and N.W. Driscoll (in press). Sedimentary Processes across the Continental Rise: Southern Antarctic Peninsula. Marine Geology.

Karner, G.D. and N.W. Driscoll (in press). Three-dimensional interplay of advective and diffusive processes in the generation of sequence boundaries. Journal of Geological Society of London.

Twichell, D.C., N.W. Driscoll, J. Ladd, and B. Hecker, (in prep.). Side-scan sonar image, and surficial geological interpretation of a part of Block Island Sound, Rhode Island: US Geological Survey Miscellaneous Field Studies Map.

Driscoll, N.W., D.C. Twichell, J.W. Ladd, and B. Hecker (in prep). Geophysical investigation of shallow-water depositional process in Block Island Sound: Before and after the passage of large storm systems. Journal of Coastal Research.

Graduate and Undergraduates

1 - female Graduate Student
    Linda Sohl - Lamont-Doherty Earth Observatory of Columbia University

5 - undergraduates supported by this project
    Greg Harvey - Bowdoin College

4 - females
    Liz Elliott - Wesleyan University
    Aimee Ploszay - Banard College
    Maureen Druin - Bowdoin College
    Jen Champagne - Bowdoin College

Service on Committees/panels

Convener - Lamont-Doherty Earth Science Colloquium, Fall Semester 1994 - Spring Semester 1995

Margins Science Plan Steering Committee meeting, Winter, 1994.

Co-Convener - Sedimentation and the Stratigraphic Record, Spring AGU, 1994.

Co-Convener - Origin, Tectonics, and Stratigraphic Development of the Caribbean Plate, American Geophysical Union Fall 1995 Meeting.

Workshop Participant at JOI/USSAC & LDEO jointly sponsored Slope Stability Workshop, April 30th, 1995.

Member, JOIDES/USSAC Proposal Panel for ODP Leg 165 (3/1996)

NSF MARGINS STEERING Committee Meeting (1/27/96)

Published MARGINS NSF Workshop Report - Driscoll, N. W. and R. Flood (in press) Margin sedimentation and the stratigraphic record. NSF Margins Workshop Report, JOI Publications 57 pgs.

Oral Presentations

Invited Colloquium Speaker UCONN, September 29th, 1995. Title of Talk: Geophysical investigation of shallow-water depositional process in Block Island Sound.

Driscoll, N.W. and G.D. Karner, (1995). Lower crustal extension along the Northwest Australian Margin: Tectonic and stratigraphic evidence for an eastward dipping detachment. EOS, Transactions, American Geophysical Union 1995 Fall meeting, v.76: F456.

Driscoll, N.W., J.B. Diebold, and E.P. Laine, (1995). New seismic evidence for late Cretaceous to Eocene turbidite deposition in the Venezuelan Basin. EOS, Transactions, American Geophysical Union 1995 Fall meeting, v.76: F615.

Driscoll, N.W. and G.D. Karner, (1996) Invited talk at Petroleum Exploration Society of Australia (PESA) June Luncheon, Perth, Australia. Title, "Lower crustal extension across the Northern Carnarvon Basin, Australia: Evidence for an eastward dipping detachment".

Driscoll, N.W. (1996). Invited Colloquium Speaker WHOI. Tectonic and Statigraphic Evolution of the Carnarvon Basin, Northwest Australia: Evidence for Strain Partitioning and Lower Crustal Extension.

Honors and Awards:
Awarded the Storke-Doherty Lectureship, Lamont-Doherty's most prestigious young scientist award, January, 1994.
Appointed as an Assistant Scientist Woods Hole Oceanographic Institution, 1995
ReAppointed as an Adjunct Associate Research Scientist Lamont-Doherty Earth Observatory of Columbia University - 7/24/1996
Appointed to Margins Steering Committee - 1/27/96